

REMARKS

This application has been reviewed in light of the Office Action dated October 15, 2008. Claims 1-8, 12 and 13 are presented for examination. Claims 14-17 have been canceled, without prejudice or disclaimer of subject matter. Claims 1, 12 and 13 have been amended to define still more clearly what Applicants regard as their invention. Claims 1, 12 and 13 are in independent form. Favorable reconsideration is requested. The canceled claims will not be further addressed herein.

The specification has been amended to conform the Summary of Invention section to the amended claims.

Claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Patent No. 2000-150934 (Nakajima et al.).

Claims 12 and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,021,100 (Ishihara et al.).

Claims 1-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,180,870 (Sano et al.) in view of Ishihara and in further view of Nakajima.

As shown above, Applicants have amended independent Claims 1, 12 and 13 in terms that more clearly define what they regard as their invention. Applicants submit that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

Claim 1 is directed to a stacked photovoltaic element comprising a plurality of unit photovoltaic elements each composed of a pn- or pin-junction, connected to each other in series, wherein a zinc oxide layer is provided at least one position between the unit photovoltaic

elements, and the zinc oxide layer has resistivity varying in a thickness direction thereof. Both surfaces of the zinc oxide layer are in contact with different unit photovoltaic elements, and a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element farther from the substrate as seen from the zinc oxide layer.

Among other notable features of Claim 1 is that both surfaces of the zinc oxide layer are in contact with different unit photovoltaic elements, and a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element farther from the substrate as seen from the zinc oxide layer. By virtue of the structure recited in Claim 1, the spread in the lateral direction of short circuit current flowing in defects of the unit photovoltaic element (in which defects cannot be treated by shunt passivation) near the substrate is limited.

Nakajima et al. relates to a photovoltaic cell including a substrate 1, photoelectric conversion layer 3, a diffusion prevention layer 4 and a reflective metal layer 5. Nakajima et al. discusses that the impurity concentration of the diffusion prevention layer 4 varies. However, Applicants have found nothing in Nakajima et al. that would teach or suggest that “both surfaces of the zinc oxide layer are in contact with different unit photovoltaic elements, and a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element farther from the

substrate as seen from the zinc oxide layer,” as recited in Claim 1.

Sano relates to a photovoltaic device. However, Sano fails to teach or suggest a zinc oxide layer provided at least one position between the unit photovoltaic elements, much less a zinc oxide layer wherein “both surfaces of the zinc oxide layer are in contact with different unit photovoltaic elements, and a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element farther from the substrate as seen from the zinc oxide layer,” as recited in Claim 1. Based on the Office Action, it is believed that the Examiner does not disagree.

Ishihara fails to remedy the deficiencies of Sano. Ishihara relates to a multi-cell photovoltaic device. As depicted in Figure 1, the device includes a p-type polysilicon 1, an n-type amorphous or microcrystalline silicon 2 disposed on the polysilicon 1, a selective reflection film 8 comprising ITO (indium tin oxide) disposed on the n-type amorphous or microcrystalline silicon 2. In addition, a p-type amorphous or microcrystalline silicon 3 is disposed on the selective reflection film 8, an intrinsic amorphous silicon 4 is disposed on the p-type amorphous or microcrystalline silicon 3 and an n-type amorphous or microcrystalline silicon 5 is disposed on the intrinsic amorphous silicon 4. Ishihara further discusses that a transparent front surface electrode 6 is disposed on the n-type amorphous or microcrystalline silicon 5, a rear surface Al electrode 7 is disposed on the p-type polysilicon 1. Ishihara also discusses a first or lower solar cell 11 and a second or upper solar cell 12. However, Applicants have found nothing in Ishihara that would teach or suggest a zinc oxide layer wherein “both surfaces of the zinc oxide layer are in contact with different unit photovoltaic elements, and a resistivity of the zinc

oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element farther from the substrate as seen from the zinc oxide layer,” as recited in Claim 1.

Accordingly, Applicants submit that Claim 1 is patentable over Nakajima et al., Sano and Ishihara, whether considered separately or in any permissible combination (if any).

A review of the other art of record has failed to reveal anything which, in Applicants’ opinion, would remedy the deficiencies of the art discussed above, as a reference against Claim 1.

Claim 12 is directed to a method for producing a stacked photovoltaic element comprising an intermediate layer between photovoltaic elements each having a pn- or pin-junction. The method includes the steps of: (1) stacking a first layer mainly composed of indium oxide on at least one interface with the photovoltaic element; and (2) stacking a second layer mainly composed of zinc oxide on and in direct contact with the first layer to form the intermediate layer, wherein the second layer is formed at a rate higher than that of the first layer.

The Office Action equates element 11 of Ishihara with first layer of Claim 12 and elements 6, 5, 4 and 3 with the second layer of Claim 12. However, elements 6, 5, 4 and 3 are not part of an intermediate layer between photovoltaic elements each having a pn- or pin-junction. Moreover, Applicants have found nothing in Ishihara that would teach or suggest “stacking a second layer mainly composed of zinc oxide on and in direct contact with the first layer to form the intermediate layer, wherein the second layer is formed at a rate higher than that of the first layer,” as recited in Claim 12 (emphasis added).

Accordingly, Applicants submit that Claim 12 is not anticipated by Ishihara.

Independent Claim 13 recites features similar to those discussed above with respect to Claim 12 and therefore are also believed to be patentable over the cited Ishihara for the reasons discussed above.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

This Amendment After Final Action is believed clearly to place this application in condition for allowance and, therefore, its entry is believed proper under 37 C.F.R. § 1.116. Accordingly, entry of this Amendment After Final Action, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, it is respectfully requested that the Examiner contact Applicants' undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

/Jennifer A. Reda/
Jennifer A. Reda
Attorney for Applicants
Registration No.: 57,840

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

FCHS_WS 1906339v1